

**ANNEX  
BETWEEN  
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
AMES RESEARCH CENTER  
AND  
NORTHROP GRUMMAN SYSTEMS CORPORATION ACTING THROUGH ITS  
AERONAUTICS SYSTEMS SECTOR  
UNDER SPACE ACT UMBRELLA AGREEMENT  
NO. 31359/SAA2-403514  
FOR  
WIND TUNNEL TESTING  
(ANNEX NUMBER FOUR)**

**ARTICLE 1. PURPOSE**

This Annex Four to the Reimbursable Space Act Umbrella Agreement SAA2-403514 (the “Umbrella Agreement”) between NASA Ames Research Center (“NASA” or “NASA ARC”) and Northrop Grumman Corporation (“Partner” or “NGC”) shall be for the purpose of performing a wind tunnel test of a vehicle design using the 11x11-Foot Transonic Wind Tunnel (“TWT”) and the 9x7-Foot Supersonic Wind Tunnel (“SWT”) at the NASA ARC Unitary Plan Wind Tunnel (“UPWT”) in order to obtain vehicle aerodynamic data. This Annex is consistent with NASA’s mission to drive advances in aeronautics. Each capitalized term used in this Annex Four, but not defined herein, shall have the meaning ascribed to it in the Umbrella Agreement.

The legal authority for this Annex, consistent with the Umbrella Agreement, is the National Aeronautics and Space Act (51 U.S.C. § 20113(e)).

**ARTICLE 2. RESPONSIBILITIES**

A. NASA ARC will use reasonable efforts to:

1. Perform a wind tunnel test in the TWT, SWT, and associated facilities that meets the testing conditions as defined by NGC and NASA, in its final wind tunnel testing requirements.
2. Provide use of its existing instrumentation and model support hardware, as necessary.  
This will include provisions of labor; equipment and supporting resources necessary to plan, prepare, perform testing, and provide data analysis support.
3. Deliver reduced wind tunnel data to NGC after completion of final test program.

B. Partner will use reasonable efforts to:

1. Provide wind tunnel test models with supporting documentation that meets NASA ARC's wind tunnel model safety criteria.
2. Provide model interface hardware to the NASA ARC facility that meets the facility

safety criteria unless compatible interface hardware exists in the NASA ARC inventory.

3. Provide instrumentation and/or data systems that are not part of the existing inventory of NASA ARC, if required. Where required, these components/systems shall be compatible with the NASA ARC Standard Data System.
4. Provide a Test Plan that includes a prioritized run matrix to indicate: model and control surface settings; model angle of attack; Mach number; other desired tunnel conditions; and acceptable tolerance levels.
5. Provide personnel and additional hardware to perform test coordination and model configuration changes and customer-supplied instrumentation, and data systems support.

### ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities for this Annex defined in the "Responsibilities" Article are as follows:

<b>Milestone</b>	<b>Schedule</b>
Final Wind Tunnel Requirements Defined (NGC)	30 days prior to tunnel entry
Receipt of Models and interface hardware NASA ARC (NGC)	Two weeks prior to tunnel entry
Enter 9x7-Foot SWT for Testing (Both Parties)	On or about November 28, 2022
Enter 11x11-Foot TWT for Testing (Both Parties)	On or about December 12, 2022
Completion of Wind Tunnel Testing (Both Parties)	On or about 2 weeks after SWT tunnel entry
Transmittal of Reduced Wind Tunnel Data to Partner (NASA)	Final reduced data transmitted within two weeks of test completion

### ARTICLE 4. FINANCIAL OBLIGATIONS

A. Partner agrees to reimburse NASA an estimated cost of \$4,400,000 for NASA to carry out its responsibilities under this Annex. Each payment shall be marked with Ames, Annex Four, SAA2-403514-4.

B. NASA will not provide services or incur costs beyond the current funding. Although NASA has made a good faith effort to accurately estimate its costs, it is understood that NASA provides no assurance that the proposed effort under this Annex will be accomplished for the estimated amount. Should the effort cost more than the estimate, Partner will be advised by NASA as soon as possible. Partner shall pay all costs incurred and have the option of canceling the remaining effort, or providing additional funding in order to continue the proposed effort under the revised estimate. Should this Annex be terminated, or the effort completed at a cost less than the agreed-to estimated cost, NASA shall account for any unspent funds six months after completion of all

effort under this Annex, and promptly thereafter, at Partner's option return any unspent funds to Partner or apply any such unspent funds to other activities under the Umbrella Agreement.

#### ARTICLE 5. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. Data produced under this Annex which is subject to paragraph C. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement will be protected for the period of three years.

B. Under paragraph H. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement, Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data provided.

1. Background Data:

The Disclosing Party's Background Data, if any, will be identified in a separate document.

2. Third Party Proprietary Data:

The Disclosing Party's Third Party Proprietary Data, if any, will be identified in a separate document.

3. Controlled Government Data:

The Disclosing Party's Controlled Government Data, if any, will be identified in a separate document.

4. The following software and related Data will be provided to Partner under a separate Software Usage Agreement:

None.

#### ARTICLE 6. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect until the completion of all obligations of both Parties hereto, or one year from the Effective Date, whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. The term of this Annex shall not exceed the term of the Umbrella Agreement. The Annex automatically expires upon the expiration of the Umbrella Agreement.

#### ARTICLE 7. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Annex by providing thirty (30) calendar days written notice to the other Party.

## ARTICLE 8. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Annex.

### Management Points of Contact

NASA Ames Research Center  
Matthew Holtrust  
Agreement Manager  
Mail Stop: 223-3, Room 100  
Moffett Field, CA 94035  
Phone: (650) 604-4069  
matthew.j.holtrust@nasa.gov

Northrop Grumman Systems Corporation  
Kelley Urling  
Supply Chain Procurement Specialist  
1 Space Park  
Redondo Beach, CA 90278  
Phone: (310) 332-7170  
Kelley.Urling@ngc.com

### Technical Points of Contact

NASA Ames Research Center  
Maureen Delgado  
Wind Tunnel Division Chief  
Mail Stop: 227-5  
Moffett Field, CA 94035  
Phone: (650) 604-1620  
maureen.a.delgado@nasa.gov

Northrop Grumman Systems Corporation  
Kian Tehrani  
Project Manager  
1 Space Park  
Redondo Beach, CA 90278  
Phone: (310) 812-8232  
Kian.Tehrani@ngc.com

## ARTICLE 9. MODIFICATIONS

Any modification to this Annex shall be executed, in writing, and signed by an authorized representative of NASA and the Partner. Modification of an Annex does not modify the terms of the Umbrella Agreement.

## ARTICLE 10. SIGNATORY AUTHORITY

The signatories to this Annex covenant and warrant that they have authority to execute this Annex. By signing below, the undersigned agrees to the above terms and conditions.

**NATIONAL AERONAUTICS AND  
SPACE ADMINISTRATION  
AMES RESEARCH CENTER**

**NORTHROP GRUMMAN  
SYSTEMS CORPORATION  
acting through its Aeronautics  
Systems sector**

BY: \_\_\_\_\_  
Eugene L. Tu  
Center Director

BY: \_\_\_\_\_  
Kelley Urling  
Supply Chain Procurement Specialist

DATE: \_\_\_\_\_

DATE: 9/21/2022